Ira Brodsky, FCC Emergency 911 Mandate: Is It Security Or Is It Surveillance"
RCR, September 1, 1997

FCC Emergency 911 mandate: Is it security or surveillance?

By Ira Brodsky

Locating mobile telephone users when they dial 911 during an emergency can be a life saver. But the recent ruling by the Federal Communications Commission inadvertently favors network-based solutions—solutions that should raise red flags for both privacy advocates and accountants. Phone-based locating is not only more reliable and accurate; it is likely to prove more acceptable to consumers and more cost-effective for carriers.

The FCC mandate requires cellular telephone, personal communications services,


Brodsky

and enhanced specialized mobile radio operators to provide public safety answering points with a mobile user's location, accurate to within 125 meters, for two-thirds of all 911 calls placed after Oct. 1, 2001. Many carriers interpret this to mean they must build locating technologies into their networks.

Here's the rub: Mobile telephone networks that can locate users when they dial 911 also can locate them at other times. Imagine what will happen when the mass media gets wind of this. How does the headline "Government Orders Mobile Telephone Companies To Shadow Users" grab you? Sure, carriers will promise to only locate 911 callers, but how long will it be before law enforcement agencies seek permission to track criminal suspects? There is no getting around the fact network-based locating creates opportunities for Big Brother-style abuses. If the wireless industry isn't careful, civil liberty organizations could soon be labeling mobile telephone services a "double-threat" to privacy.

Eavesdropping, radio-frequency health hazards and tracking are explosive issues not because the risks are high, but because the risks are involuntary. Millions of people go skiing, smoke cigarettes and drive on interstate highways—and think nothing of it. But expose them to the slightest risk (or just suspected risk) without their expressed permission and they become angry. While it would be paranoid to think our government wants to track innocent users, it would be naive to think no government official has ever exercised bad judgment.

Fortunately, there is a simple remedy: Move locating to the handset where it can be controlled by the end-user. For safety reasons, the phone's default setting should be to automatically perform a position-fix whenever the user dials 911.

Most people will probably leave it configured that way. But they also will have the option of locating themselves on demand, a feature useful for personal navigation.

Solutions are being developed that will enable handsets to use the satellite-based global positioning system. Having every mobile telephone operator build its own locating network when there is a global solution available for free is wasteful. But building terrestrial locating networks when GPS can be shown to be more reliable and accurate is just plain unwise.

GPS was designed specifically for locating. One of its

City of Akron will deploy Motorola data network

AKRON, Ohio—The city of Akron, Ohio, said it awarded Motorola Inc.'s Land Mobile Products Sector a $3.1 million contract to install a state-of-the-art mobile wireless data solution for the city's police, fire and emergency medical services operations.

The new mobile data system is designed to help police officers access information faster while operating in the field. The data system implementation is part of the city's long-range plan to provide the most current communications technologies for Akron's public-safety officials.

As part of the contract, Motorola will upgrade Akron's existing two-site, two-channel 4.8 kilobit-per-second Private DateTAC system to run a RD-LAP 19.2 kbps system, one of the first technologies to combine the industry's fastest wireless data rates with a reliable data protocol, said Motorola. Akron also recently became one of the first municipalities in Ohio to install a Motorola ASTRO digital 800 MHz trunked two-way radio voice system. The new wireless data system will augment the existing ASTRO system.

Included in Motorola's data solution will be an automatic vehicle location capability using global positioning system technology.

Additionally, Motorola will upgrade the existing message switch and add a new redundant message switch. The message switches will allow the system to interface with the Ohio LEADS state database, as well as the Tiburon Computer-Aided Dispatch RMS and Police Works Gateway Report Writing programs, and an AVeL TECH Automatic Vehicle Locator server. The project is scheduled to be completed by 1999.

E911

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uously improved, there will always be new users buying new phones and long-time users eager to upgrade their phones.

Which type of E911 locating technology a carrier chooses—network-based or handset-based—could have a profound impact on the ability to serve other locating applications. If operators feel constrained to a network-based solution, they may, in response to users' privacy concerns, hesitate to employ it for anything other than E911 calls. There also is no guarantee a network overlay designed for emergency locating—a sporadic occurrence—will have the ability to continuously track fleets of vehicles for commercial customers.

A handset-based solution opens the door to a constellation of applications—from fleet management to personal navigation to location-based pricing—all under customer control. The user can initiate a position fix, or request continuous tracking, at the push of a button. The network server can play host to a variety of applications. And integrating GPS in the handset is consistent with the trend towards smarter phones with enhanced data input/output capabilities.

The current FCC mandate favors a "mainframe" solution at a time when wireless handsets are looking more and more like personal computers. Sure, a different mandate might have favored the handset approach. But what is really important is that the wireless industry must be free to pursue both paths—let the best solution win.

Ira Brodsky is president of Datacomm Research Co., a telecommunications consulting firm in Chesterfield, Mo. His book, "Wireless Computing: A Manager's Guide to Wireless Networking," is available from Van Nostrand Reinhold (New York, NY) or by calling (800)-842-3636.

Stephania H. Davis "In My Opinion The Business Of Saving Lives" Telephony , May 26, 1997

IN MY OPINION: The business of saving lives

(Telephony)

One year after the Federal Communications Commission mandated that wireless carriers implement systems to locate emergency phone calls, the players involved are still circling the issue.

The sticking point is money. How much will it cost to deploy wireless ***enhanced* 911,** and who is going to pay for it?

Those questions are legitimate. The equipment to purchase location technology for every cell site will cost the wireless carriers millions (see story on page 64). Public safety answering points, or PSAPs, pass the incoming calls on to the appropriate emergency agency. The PSAPs will have to update their wireline-based systems to accept 10- digit numbers.

There is money to be made here, too, for location technology vendors and for the wireless carriers that will sell phones to customers who want only the capability to get emergency service if they are ever in danger and can't describe their location.

To be fair to wireless carriers, those revenues will pay for neither all the technology upgrades needed this year - if the FCC's first deadline is to be met - nor future enhancements, since the technology is still emerging.

Customers are willing to pay some of the costs, but wireless carriers hesitate to raise fees to the point where the cost outweighs the convenience. Studies show that some 80% of wireless users bought their phones just for safety.

But the issue isn't as much about money as it is about people like Karen Nelson and Richard Gatto. Nelson's truck was snowbound during a South Dakota storm last winter when she called for help. She could not provide her location, so she had to wait several hours to be rescued. Wireless E911 technology could have shortened her agonizing experience.

Gatto led New Jersey police to a group of vandals with his phone. Last week, he was awarded Comcast Cellular One's Good Samaritan Award for demonstrating the key role wireless now plays in public safety.

Public safety is what wireless E911 is about. The money issue is complex, and there are lots of details, including technology standards and cooperation between businesses and municipalities. Still, each group can work together to clear the obstacles. They should, before next winter hits.

Stephania H. Davis, IN MY OPINION: The business of saving lives., Telephony, 05-26-1997.

Jon Healey. "Cell Phones As Personal 911 Alarms Win Patent" San Jose Mercury News , September 16, 1997

BUSINESS

Cell phones as personal 911 alarms win patent

BY JON HEALEY
Mercury News Staff Writer

TUESDAY FOCUS: New Ideas

As an emergency-room physician in Santa Rosa, Dr. Dan Schlager learned how swift the passage from life to death can be. That's why he started thinking of ways to reach a victim while there was still a life to be saved.

Now Schlager is championing a communications system that might shave crucial minutes off a rescue squad's response time, or even avert a tragic mishap. His approach, which won a U.S. patent in July, involves creating the ability to track portable devices by marrying a satellite-based mapping technology with electronic sensors and wireless phones to create mobile "personal alarm systems."

The devices envisioned by Schlager take a variety of forms, all of them small and highly portable. Examples include a modified cellular

See FOCUS, Page 6C

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Cell phones pushed as personal 911

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phone, a hand-held smoke or water detector, and wearable devices that activate invisible fences.

So far, Schlager has not found anyone to build these products. One of his hopes, though, is that wireless phone companies will use his system to solve one of the biggest weaknesses in their networks: the inability to trace people who call for help.

Schlager and his co-inventor, William B. Baringer of Oakland, are not the only ones proposing ways to locate wireless 911 callers; they're not even the first. Several companies are touting their own call-locating technologies in the battle over what could be a multibillion-dollar upgrade.

The competition is quickly coming to a head, thanks to a looming federal mandate. Under a Federal Communications Commission order, wireless phone companies have until October 2001 to make whatever changes are needed to locate 911 callers, if local public safety officials want such information (and can afford the necessary equipment).

Sparked by experience

Schlager's involvement sprang from his work on the medical front lines, seeing victims rushed in just a little bit too late. One incident remains a vivid memory, he said. A young boy fell into a neighbor's pool one night while his mother was at work, and doctors in the emergency room were not able to revive him.

Two weeks later the boy's mother was back in the emergency room, having tried to kill herself. She survived.

"It was really heart-wrenching," Schlager said. In cases like the woman's son, he said, the weak link in the rescue chain was not in the ambulance or the emergency room, it was in reaching the victim. Too much time was lost either in getting the 911 call or in finding where the call was coming from.

Such delays are increasingly damaging, Schlager said, because many of the most promising new therapies are effective only if delivered within the first few hours of a medical crisis, such as a heart attack or stroke. Similarly, he said, doctors have a much higher chance of saving accident victims if they are treated within an hour of the trauma — the so-called golden hour of survivability.

Schlager said he started thinking about ways to find victims faster in 1991, long before the FCC issued its order. He approached Baringer, a friend from high school who has a doctorate in electric engineering, and the two started coming up with ideas for ways to protect children from fatal mishaps.

TUESDAY FOCUS:
New Ideas

A key element in their approach is signaling the victim's location as well as sending an alarm. Although the patent does not specify a locating technology, Schlager said one possibility is the global positioning system, or GPS, a navigational aid that the military developed in the 1970s to guide troops and weapons. A GPS receiver tunes in radio signals from satellites to identify the receiver's longitude and latitude.

> Phones would be equipped with a panic button to automatically dial 911, activate the GPS and transmit a caller's location.

Once the size of a suitcase, GPS receivers now are smaller than a credit card. Indeed, GPS technology now fits on a single microchip that costs less than $50; as a consequence, more and more products are being equipped with GPS capabilities.

Schlager and Baringer's patent covers a variety of ways to create personal alarm systems with sensors attuned to specific hazards, such as carbon monoxide emissions or electric shocks. The system also could be used to signal the position of a child or an Alzheimer's patient, sending an alarm if the person ventured outside a prescribed area.

One problem with using GPS is that the federal government, for national security reasons, requires that civilian GPS signals be less precise than the military version. Until that policy is changed, a basic GPS receiver will give readings that are off by anywhere from a couple car lengths to a football field.

By combining the GPS signals with signals from a fixed point on land — a technique that multiplies the cost of a GPS receiver — the precision can be improved to near-pinpoint accuracy. Without such a combination of signals, today's GPS may not be accurate enough to locate people quickly in an urban setting or a dense forest, said John V. Hamilton, a GPS consultant.

Although the patent office found Schlager and Baringer's approach novel, similar versions of some of their proposed devices already are popping up. For example, GPS is being used to help locate mobile phone callers, although such products are not yet available to the public, said Tricia Tan, a marketing manager for Trimble Navigation Ltd. of Sunnyvale. Trimble is one of the leading U.S. manufacturers of GPS components.

Meeting the mandate

The phone companies have not yet settled on a way to meet the 911 mandate. The most thoroughly tested — and costliest — approach is triangulation, or getting a fix on a mobile phone by noting when its signal reaches different antenna towers.

Another approach that could prove to be less expensive is the "radio camera" system, developed by U.S. Wireless of San Ramon. This system calculates a mobile phone's location by analyzing how its signals reflect off buildings and other objects en route to an antenna tower.

Under Schlager and Baringer's approach, consumers who buy their mobile phones would bear the bulk of the enhanced 911, or E-911, costs. Phones would be equipped with a GPS receiver or similar device and a panic button that would automatically dial 911, activate the GPS receiver and transmit the caller's location.

A significant problem with using GPS is that the FCC mandated that phone companies be able to locate all wireless 911 callers on request. To meet that standard through GPS, every existing mobile phone — more than 50 million and growing — would have to be traded in or retrofitted with a GPS receiver.

Herschel Shosteck, a wireless phone analyst, said the staggering cost of wireless E-911 could pressure the FCC to apply the mandate only to new phones, just as federal regulators have applied automobile safety requirements only to new models. "If it's too expensive, somebody will balk. And the FCC has to take that into account," Shosteck said.

George Lurie, "Zoltar Alarms Awarded Patent To Integrate GPS With Wireless"
RCR, July 28, 1997

A WEEKLY NEWSPAPER FOR THE WIRELESS INDUSTRY
RCR
JULY 28, 1997 www.rcrnews.com VOL. 16, NO. 30

NOTABLE QUOTE

"Why build a $5 billion Dodge Dart when you already have been handed the keys to use the Mercedes?"
—Zoltar President Dan Schlager.

Zoltar Alarms awarded patent to integrate GPS with wireless

By George Lurie

Zoltar Satellite Alarm Systems has been awarded a broad U.S. patent covering integration of global positioning systems with wireless communications for use in personal safety and security devices. Zoltar's new technology will be applied to a variety of applications including the use of GPS to locate 911 callers using cellular and other wireless networks.

The company's new "pioneer" patent, accompanied by existing international patents, includes combinations of GPS, wireless voice communications and an emergency button or other manual or automatic sensors to activate a 911 satellite-based emergency response network.

"Doctors and rescue personnel are increasingly frustrated by roundabout and indirect calls for assistance in life-threatening situations

where the emergency location cannot be fixed," said Zoltar President Dan Schlager, whose company's first patent covering GPS integration with wireless was issued in 1995. "Integrating GPS and cellular technologies offers the most cost-effective and accurate solution to this problem."

Schlager, Zoltar's founder and also a board-certified emergency physician, has focused much of his company's efforts during the past seven years on using emerging technologies to enhance rescue services.

More than 50,000 cellular 911 calls reportedly are placed in the United States every day and the Federal Communications Commission has mandated that by 2001 wireless network operators develop and implement an emergency system that can pinpoint the location of wireless 911 callers to within 125 meters.

According to analyst Clement J. Driscoll of Palos Verdes Estates, Calif., "current network solutions for identifying emergency 911 location [are estimated to] cost about $50,000 per base station, which means that nationwide coverage for cellular and PCS networks would cost several billion dollars"—assuming local jurisdictions will allow antenna towers and other facilities to be built.

The FCC's E911 mandate allows for carriers to pass on E911 network costs to state and local governments, and subsequently to taxpayers.

But with a GPS-based system built into wireless phones, Schlager said that only wireless consumers would cover the cost of creating a wireless E911 network.

"Network solutions impose the burden of initial capital costs on cellular carriers; terminal solutions hold the advantage of minimizing capital costs," said analyst Herschel Shosteck, president and CEO of Herschel Shosteck Associates Ltd.

Schlager said his company already is forming alliances with wireless network operators and equipment suppliers to develop and market GPS-based products to enhance the safety and security of mobile consumers.

"Integrating GPS with cellular and PCS phones is currently the only reliable, low-cost method of providing wireless subscribers with E911 service," said Schlager. "Why build a $5 billion Dodge Dart when you already have been handed the keys to use the Mercedes?"

Jonathan Marshall, Cell Phones New Role-Emergency Locators, San Francisco Chronicle, July 22, 1997

Cell Phones' New Role – Emergency Locators

By Jonathan Marshall
Chronicle Staff Writer

Lost in a blizzard on a rural road in South Dakota last January, Karen Nelson waited 40 terrifying hours before rescuers, who heard her calls for help by cellular phone, could find her.

Currently, emergency response units can't pinpoint the location of cellular callers as they can when people use regular land line phones.

But life-threatening delays such as Nelson suffered might be prevented if cellular phone makers exploit a patent issued today to a Mill Valley doctor.

Dan Schlager, an emergency room physician in Santa Rosa and San Francisco, proposes integrating cellular phones with global positioning system receivers so authorities can instantly locate callers who are in mortal danger — or merely lost.

The global positioning system was developed by the U.S. military to help ships, aircraft and ground troops pinpoint their location. Receivers fix their position by triangulating signals from satellites.

Schlager doesn't have a product yet, but a Massachusetts inventor has already made a prototype phone using the same idea, proving it can work.

And thanks to a federal requirement that the wireless industry devise an emergency locator system within four years, a lot of big companies may soon be knocking at Schlager's door.

Wireless customers make 59,000 emergency 911 calls every day. If the callers are lost, emergency personnel at best can tell what cell site they're in — an area that can stretch many square miles.

Delays in responding to emergencies can kill, as Schlager saw first-hand a few years ago while flying around Silicon Valley in a medical helicopter for Stanford Hospital. Back then, the best method for spotting victims was sticking his head out the window and looking for overturned cars.

"Often we'd get there too late," he recalled. "What we needed wasn't a faster helicopter, but a way to locate victims faster."

Then the Persian Gulf War broke out and Schlager read about U.S. troops maneuvering their way around the faceless deserts of Iraq with global positioning system equipment.

"Systems then were the size of a backpack and cost $15,000, but we figured if they got smaller and cheaper it would solve the victim-location problem," he said.

Schlager won a preliminary patent in 1994 for a crude GPS/cell phone combination. He turned down a job as head of the emergency department at Kaiser in Santa Rosa to devote more time to his new company, Zoltar Satellite Alarm Systems, and to broaden and refine the patent issued yesterday.

Schlager's latest patent is timely. Last year, the Federal Communications Commission ruled that wireless carriers must find and implement a way to locate callers within a radius of no more than 125 meters (about 410 feet), two-thirds of the time, by the year 2001.

"It's a very complex requirement," said Ed Evangelista, manager of corporate network programs at AirTouch Communications, the San Francisco-based wireless company. "None of the technologies we have evaluated today satisfies the FCC requirement."

One method is to locate calls by measuring the time it takes the signal to reach three nearby cell sites. A prototype system, recently tested in New Jersey and Texas, actually came to the rescue of a woman whose car broke down in April in southern New Jersey. But it requires about $50,000 worth of equipment in each cell site — a solution that could easily cost carriers more than $5 billion to implement.

The alternative is to build a tiny GPS receiver on a chip into the handset, as Schlager proposes. Such a system would work well in rural areas where callers might reach only a single cell site.

"That's where you need (an emergency locator) the most — not on 5th Avenue," Schlager said.

A GPS-equipped phone also might be able to pinpoint callers much more accurately than alternative methods, said Clem Driscoll, a Southern California consultant.

In a few years, GPS systems will be able to locate their position within an average of 15 meters (about 49 feet), Driscoll said.

The handset solution also gives callers more privacy.

Government officials would know the location of callers only when they hit 911 or a panic button, instead of tracking callers continuously.

The downside, said AirTouch's Evangelista, is what to do about all 40 million existing cellular phones. Wireless providers wouldn't meet the FCC mandate unless customers turned in all their old handsets.

Converting them all to GPS would also cost billions of dollars.

"It may be necessary for the FCC to revise the rules so only new phones need to come equipped with the technology," said Driscoll.

Another issue is how much bigger, heavier and costlier phones will become with GPS receivers.

"It's unlikely that consumers will buy a heavier phone," said Herschel Shosteck, a cellular industry analyst in Wheaton, Md.

Robert Tendler, a patent attorney in Cambridge, Mass., thinks consumers will buy such a phone — and he's already developed a prototype that weighs 11.5 ounces, only 3.5 ounces heavier than the average phone.

It costs about $150 more to make than standard phones, but the cost will come down with mass production.

Tendler and Schlager are aware of each other but haven't yet sorted out their patent rights.

Tendler's phone was developed with funding from his former fraternity brother, prominent Berkeley attorney Jesse Brill.

"I invested in part because I wanted my wife and daughters to have one for security," Brill said.

"It's frustrating that no one has jumped on it yet."

BY JOHN O'HARA/THE CHRONICLE

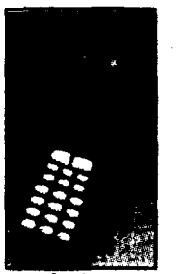
Dr. Dan Schlager, emergency room doctor at California Pacific Hospital, holds the cellular/GPS patent

PINPOINTING CALLERS' LOCATIONS

▸ **NOW:** With existing cellphones, carriers cannot locate callers

▸ **BY 2001:** The FCC will require carriers to offer cellular phones with emergency locator systems able to determine where callers are within 410 feet

▸ **PROJECTED:** Cellular phones equipped with Global Positioning System chips will be able to locate callers within 49 feet



Fonefinder handset from Tendler Cellular includes a GPS receiver

Source: Chronicle research

Tom McHale, "Digital Market Up--Digital Handset Sales In U.S. Increase 73%", Electronic Buyer News, March 10, 1997

Digital Market Up -- Digital Handset Sales In U.S. Increase 73%

ELECTRONIC BUYERS' NEWS

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Fremont, Calif. - After years of lagging behind the market for inexpensive analog **cell phones,** the U.S. digital **cell *phone*** market showed signs of **life** in 1996.

Vendors shipped 1.46 million digital handsets in the U.S. market last year, a jump of 73% from 1995, according to Dataquest Inc., San Jose. In addition, the market was turned on its head, said Clint McClellan, who tracks the cellular **phone** business for Dataquest. Motorola Inc., which had led sales in digital handsets, lost its lead to Sweden' s Telefon LM Ericsson and Finland's Oy Nokia, which took over as No. 1 and No. 2 in the market, respectively, relegating Shaumburg, Ill.- based Motorola to No. 3, McClellan said.

Ericsson shipped about 812,000 digital handsets last year, up 184% from 1995, and accounted for 55.7% of the U.S. market, according to Dataquest figures. Nokia shipped about 482,000 digital handsets in the U.S. market last year, up 99% from 1995, and took 33% of the market.

With the rollout of the long-delayed Code Division Multiple Access (CDMA) digital technology last year, a new player, Qualcomm Inc., joined the market. The San Diego-based company, which developed the CDMA technology, shipped 42,000 digital handsets and picked up 2.9% of the U.S. market in 1996.

Motorola, however, saw its U.S. digital handset shipments decline to 117,000 in 1996 from 305,000 in 1995, and its U.S. market share plummet to 8% from 36.3%, Dataquest said.

A Motorola spokesman said that while Dataquest's 1995 figures are accurate, the 1996 figures are not. He said Motorola's U.S. sales of digital handsets in 1996 were about the same as in 1995.

He also said that it is misleading to view Motorola's digital handset sales in the United States without considering global sales.

McClellan attributed Ericsson's strength last year to aggressive pricing, which even outpaced rival Nokia.

Nobody is counting Motorola out of the market, though. The company' s experience in price-sensitive businesses such as analog **cell phones** and pagers, combined with its global reach, should put it in a good position to take advantage of the shift to PCS, according to Robertson Stephens & Co., a San Francisco investment bank.

"Watch for PCS sales to explode in 1998," said John Ledahl, a Dataquest telecommunications equipment analyst. "PCS only had about 300,000 subscribers in the U.S. as of year-end 1996, but that will be a 98 million-handset business by the year 2000," he predicted. Motorola' s success in PCS in the U.S. market will also depend on the acceptance of CDMA technology.

Newsbytes News Networks, "Enhanced 911 to Ease Consumer Confusion," December 19, 1996.

Enhanced 911 To Ease Consumer Confusion

(Newsbytes News Network)

***Enhanced* 911** To Ease Consumer Confusion 12/19/96

WASHINGTON, DC, U.S.A., 1996 DEC 19 (NB) -- REPEAT/By Bill Pietrucha. **Enhanced 911** emergency services for wireless phones will greatly increase safety and security, even though most US wireless customers aren't even aware that current 911 technology may compromise their safety, said officials from a company that's looking to improve 911 systems.

Although wireless telephone users nationwide make more than 50,000 911 emergency calls daily, few of these callers realize that 911 dispatchers don't automatically know a wireless caller's phone number or location.

"These are two critical pieces of information in an emergency," Jane Bissonnette, director of 911 services for Xypoint, told Newsbytes. By contrast, she said, most 911 calls made today from fixed-location phones automatically provide enhanced information such as a caller' s phone number and address.

"Most wireless users simply don't understand that 911 doesn't work the same for wireless and landline phones," Bissonnette said.

"Wireless phones are an invaluable tool for personal safety," she said, "but people need to understand that emergency dispatchers don' t automatically know your phone number or where you are. If a call is disconnected, the emergency dispatcher has no way of calling back." Recent developments and demonstrations for enhanced, or E911 services, will solve these problems, she said.

The Federal Communications Commission (FCC) last June issued a two- phase order that required 911 networks to provide dispatchers with a cellular caller's 10-digit telephone number (Phase I); and the location of a cellular caller within a radius of 125 meters in 67 percent of all cases (Phase II). Phase I must be completed within 18 months of the order, while Phase II must be completed within five years of the order.

Since the order was released, Bissonnette said that wireless carriers are working with companies such as Xypoint to provide emergency call centers with a wireless caller's 10-digit phone number and cell site location.

"Wireless **enhanced 911** will save lives and property by enabling dispatchers to respond more quickly and efficiently to emergencies," Bissonnette said.

Wireless 911 callers frequently don't know where they are, especially if they're traveling in an unfamiliar area, Bissonnette said. Even if they do know where they are, an emergency dispatcher may be hundreds of miles away and not know local landmarks, she added.

Duane Noriyuki, Just Think of It as A Big Eye In The Sky Los Angeles Times, April 27, 1997

Los Angeles Times
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Just Think of It as a Big Eye in Watching; Technology: Develo the satellite Global Positioning adapted to steer you away from your

Just Think of It as a Big Eye in the Sky . . . Watching Technology: Developed for military use, the **satellite *Global* Positioning** System has been adapted to steer you away from gridloc keep your golf ball out of the bunkers.
By DUANE NORIYUKI, TIMES STAFF WRITER

Los Angeles Times Sunday April 27, 1997
Home Edition
Life & Style, Page 1

FALCON AIR FORCE BASE, Colo.--There is little but prairie surro buildings. From the time authorized personnel slide their personal badges through the card reader and punch in a four-digit access co they have 15 seconds to pass through a door leading to the master station.

Down a long hallway, seven people in blue jumpsuits work at com terminals. At their charge is the planet's largest constellation o **satellites,** 26 in all, each the size of a Volkswagen Beetle, hurli through space at 8,600 mph.

"We have about 165 great Americans keeping this system operatio hours a day," says Lt. Col. Joe Squatrito, commander of the 2nd Sp Operations Squadron.

Nearby is a room where temperature and humidity are controlled time, monitored by the U.S. Naval Observatory, is broken down to 370-trillionths of a second.

All this security, all the **satellites,** all the precise work of these great Americans can help save lives in war. In peace, they c guide emergency workers to victims of fires or earthquakes, or hel locate you if you are lost or stranded. They can also help athlete train.

And when you're teeing off at the Pelican Hill Golf Club, overl the scenic Pacific shore south of Newport Beach, they can help sav from the bunkers.

The **Global Positioning** System was developed as a military navig tool, first used in Somalia and later in the Persian Gulf, guiding through desert terrain void of geographical reference points.

But in the private sector, it has triggered an all-out sprint t develop new applications as GPS, a means of pinpointing location, integrated with communications networks, mapping systems and other technologies.

Last year, Vice President Al Gore predicted that GPS would beco $8-billion industry by the end of the century. Some say it will ch

how we live.

And here behind locked doors at Falcon Air Force Base is where frenzy quietly begins. If you have ever been asked, "Where are you have ever awakened and wondered that yourself, these folks can tru you.

In terms of latitude, longitude and even altitude, GPS quickly provides coordinates to anyone with a receiver. Through GPS techno virtually every square inch on the planet is given an address.

GPS allows us to establish Point A, a crucial bit of informatio we're trying to get to Point B, whether we're in a Bradley Fightin Vehicle, a rental car, police unit, airplane, sailboat, golf cart foot.

Receivers, decreasing in size and price, are available for less $200 and approach the size of a wristwatch. Some systems are so ac they are used in surveying and mapping, measuring the growth of mountains, the movement of glaciers.

"They're going to continue coming up with things we haven't eve thought of yet because it's so precise," Squatrito says. "We're ge it down to the point where I can go find somebody, walk right up t in pitch-black darkness and, boom, bump right into him."

The system became operational in 1993 with less than a dozen **satellites** and limited coverage capabilities. **Global** coverage, req at least 24 **satellites,** began two years ago. The system also trans time, guaranteeing accuracy within 28 nanoseconds (billionths of a second), and detects nuclear detonations anywhere on Earth.

The **satellites** transmit codes on two frequencies, one limited t military use. It's more precise than the code available to civilia which is intentionally degraded out of concerns that it might be u against the military.

Last year, President Clinton issued a directive to bring the st and accuracy of the civilian code closer to that of the military. private industry already has developed technology to increase accu in some cases to the foot.

Or even the centimeter.

*

In everyday life, of course, knowing our latitude, longitude an altitude isn't all that helpful.

"GPS by itself is sort of like electricity by itself," says Gle Gibbons, editor of GPS World magazine. "Until you have created a t integrated it with other information and other technologies, it do do much for you."

Seeing potential requires vision. Charles Trimble had quit his Hewlett-Packard and started a business in the late 1970s before he about the coming of GPS, a technology that grew from concern about navigation shortcomings during the Vietnam War.

"I knew it was going to be a long time coming," Trimble says, " was wondering how any small company could figure out how to get in beginning and survive until it became a reality."

Trimble turned to history and Alexander Graham Bell.

"When he came up with the telephone, obviously he didn't see th telecommunication industry that we're exploring today," Trimble sa

"The early GPS was a lot like the telephone in terms of being something new from an information utility standpoint. So we could our minds by looking at what happened over the course of a hundred from his invention to the present to see what might happen with GP was when we started thinking in those terms, rather than thinking reality of the hardware, that we could start seeing how it was goi change people's lives."

Trimble, who also chairs the U.S. GPS Industry Council, now hea world's largest manufacturer of GPS equipment. Based in Sunnyvale, Trimble Navigation has about 1,100 employees and last year showed revenues of $235 million.

In the future, Trimble says, GPS will further expand its uses. help marathon runners keep a steady pace. If you want to run at a 6.4-minute per mile clip, he says, a wrist receiver will beep if y deviate.

If you are training for a marathon, you will be able to measure changes in your heart rate based on the degree of incline.

Some cars already are equipped with GPS electronic mapping syst that guide drivers to their destinations and avoid traffic congest

The Irvine Police Department uses a tracking and navigation sys which not only gives locations of marked units but also gives dire of travel and speed.

Susan Thayer, the department's Communications Bureau supervisor in one case they became concerned when they were unable to reach a officer by radio. They located his car through the GPS system and another patrol unit to check on him. Fortunately, Thayer says, it out the officer was fine, but his radio wasn't working.

(The Los Angeles Police Department currently does not use the technology, but three helicopters on order are equipped with GPS navigation capabilities.)

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Systems equipped with electronic voices are helping the blind f their ways. In Japan, elderly people who wander off may soon be we receivers so they can easily be found. Parents also will give them their children.

Airlines are finding more efficient routes. Overnight delivery services are tracking down packages. Trucking companies are monito their fleets. Firefighters are arriving sooner.

Remember those bench scenes in "Forrest Gump"? Cinematographer Burgess, who was nominated for an Academy Award for his work on th used GPS, integrated with sun data, to determine months in advance exact time the sun would be in the right position to shoot the sce

And at the Pelican Hill Golf Club, carts are equipped with ProS Golf's OmniGolf units. In 1995, ProShot installed systems at four courses. Last year, the figure jumped to 35. This year, ProShot ex to deliver 70, and the five-year goal is 500.

As you study the pin in the distance, a monitor tells you how f are from the green, the bunkers, the water. It describes the slant green.

Movements of carts can be monitored on a computer screen in the shop. If you're lagging behind, you may get a message asking you t up play. If there's lightning in the area, you're notified to retu immediately to the clubhouse.

Some golfers reflect the concern that GPS is an intrusion, the in of Big Brother. The reason they're on the course in the first p to escape the messages, the pace, the technology. They're uncomfor knowing the movement of their cart is monitored.

Such complaints usually are short-lived, says Mark deGorter, Pr vice president of marketing and sales. They subside, he says, when golfers see that the system has improved their game by three or fo strokes.

DUANE NORIYUKI, Just Think of It as a Big Eye in the Sky . . . Watching; Tech use, the satellite Global Positioning System has been adapted to steer you away fro Angeles Times, 04-27-1997, pp E-1.

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Laurence Swasey, "Subscribers Will Pay For E-911", Wireless Week September 1997

Subscribers Will Pay For E911

Carriers With Location Service Have Advantage

By Laurence Swasey

Existing and potential cellular subscribers rate enhanced 911 services as a needed service worth paying for. A recently concluded survey found E911 services also could mean the difference between using one carrier over another.

The survey was conducted by Public Opinion Strategies of Alexandria, Va., and commissioned by E911 technology provider The Associated Group Inc. of Bala Cynwyd, Pa. The company offers its TruePosition technology for carriers to comply with phase I and phase II of the FCC's wireless 911 access ruling.

"I have heard people say that it is a service they want," said Ira Brodsky, president of Datacomm Research Co. in Chesterfield, Mo. "It's not clear that consumers want a network-based service vs. a handset-based approach." With handset-based location services, such as the global positioning system, consumers could turn the feature off and on, ensuring their location is only tracked when desired.

Most people are unaware of E911 issues, said Louis Stilp, Associated's vice president and general manager. Once the public is aware of a cellular phone's limitation in regard to 911 services, interest in location services is created, he added.

"Cellular users and potential users overwhelmingly feel that wireless enhanced 911 with emergency location capability is an important and valuable service, and they are generally (62 percent) not aware that 911 operators do not know the caller's location today," the report said.

Many existing and potential users said the location service would be seen as a competitive advantage in the marketplace. Overall, consumers were more likely to switch to the carrier that offered the technology, Stilp said.

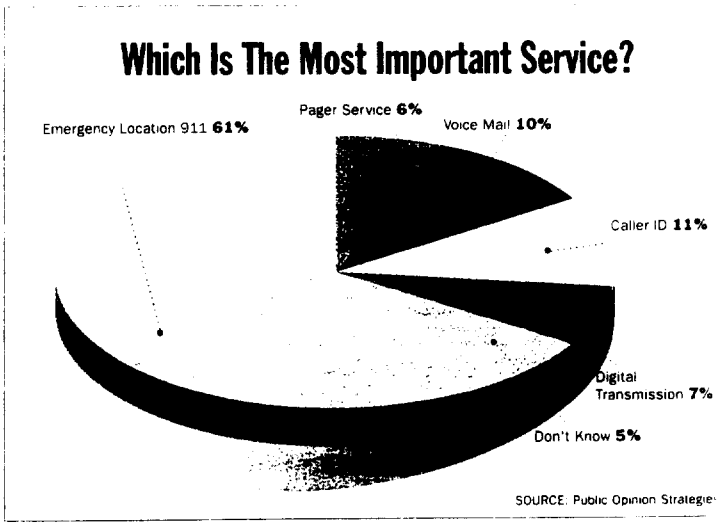
According to the report, "If one carrier offers emergency location service for a mandatory fee and a competing carrier does not offer the service, the carrier offering the location service with a mandatory fee will have a potential net customer gain of 32 percent if the fee is $1 and a potential net customer gain of 25 percent if the fee is $1.50."

With a $1 mandatory fee, more potential customers (88 percent) said they would move toward the service rather than from the service (20 percent). With a $1.50 mandatory fee, potential customer movement was greater to the service (84 percent) than movement from the service (30 percent).

In addition to requesting the service, users also are willing to pay for it, the report said. "They are willing to pay an average of $3.30 to obtain emergency location service, and rank the service as more important than many other features currently offered by carriers, including caller ID, voice mail, paging and digital."

Women were willing to pay more for the service than men ($3.62 vs. $2.92). Those who a not currently cellular subscribe were willing to pay more for t service than those currently su scribing ($4.52 vs. $2.81).

Out of the 800 surveyed in l July and early August, 558 we cellular users while 242 were n A random digit dial screening f current and potential subscribe was used, and the study resul have a margin of error of plus minus 3.46 percent in 95 out 100 cases. The sample was th same size as The Strategis Grou Inc. used when surveying for study on E911 pricing March.



E911 Firms To Continue Testing

By Laurence Swasey

Enhanced 911 technologies have moved out of the concept stage and into design and test phases. As the FCC contemplates the final ruling on E911, many companies are going ahead with plans to build systems while others are rushing to design and test E911 solutions.

The Associated Group Inc. of Bala Cynwyd, Pa., is continuing the trial of its TruePosition technology on the New Jersey Turnpike, said Louis Stilp, the company's vice president and general manager. The initial 90-day field trial of the company's phase II E911 technology concluded with the decision to continue testing and fine tuning the technology, he said. The system is deployed on Comcast Cellular Communications Inc. cell sites surrounding a 50-mile stretch of the turnpike.

The test site has turned into an engineering platform, with technicians making adjustments to the system, Stilp said. Associated is ready to ship the product and is negotiating with carriers. Test results prepared by New Jersey officials also are available, he added.

Associated is continuing to develop an Interim Standard-136 time division multiple access application in addition to the advanced mobile phone service application, Stilp said.

Associated's TruePosition, which works in tandem with a number of elements from other vendors, allows wireless carriers to comply with FCC E911 rules. The rules mandate if a public-safety answering point asks, service providers must supply a wireless handset's 10-digit number to the closest PSAP as part of phase I E911 rules and the caller's location within 410 feet as part of phase II compliance. Although the FCC has mandated that phase I requirements be met by April 1998 and phase II by October 2001, the FCC is currently reconsidering the dates.

TruePosition is implemented by adding receiver signal collection systems in an optimal 80 percent of the carrier's coverage cell sites. A time difference of arrival location processor also is added to the network, likely at the mobile switching center.

The tests showed that placing the 24 test receivers in a "more mesh-like configuration" instead of a corridor fashion will deliver more accurate results, and an 80 percent penetration of receivers in cell sites is needed, Stilp said. The 24 test receivers accounted for 55 percent penetration in cell sites.

With an eye on next year's deadline for wireless E911, Xypoint Corp. is still waiting to trial its E911 phase I technology with Vanguard Cellular Systems Inc.'s Cellular One system in Allentown, Pa.

"We don't think of this as a trial," said Xypoint President and CEO

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Ken Arneson. "If this works as expected, we will roll out with it."

Although the trial was to begin last May, it has been delayed while Cellular One waits to have a trunk added between its switch and the local exchange carrier's 911 tandem switch. "That's what is holding us up," Arneson said.

Seattle-based Xypoint's E911 technology works by routing the wireless caller's 10-digit number to the PSAP over a dedicated E911 server. Along with the 10-digit number comes the geographic information disclosing the approximate location of the caller as determined by the cell site or base station used during the call.


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The wireless data will be displayed on a screen while the voice of the wireless user arrives over the landline network. Without the technology, the PSAP screen appears blank, although the voice channel arrives at the PSAP through landline delivery, and PSAP operators must rely on the wireless 911 callers to describe their locations, which may be difficult or impossible in some situations.

Atlanta-based CML Technologies Inc. is testing its E911 phase I technology with GTE Telephone Operations. CML has bundled its wireless call delivery option into its wireline PSAP server.

The system was launched last June and the tests have been running smoothly, according to Tony Parrott, CML national sales director. "The biggest issue is the funding," Parrott said. Funding may not be available for at least a year. The test is due to end soon, he said.

The test is being held in Lorrain County, Ohio, which covers a population of 275,000 in 495 square miles. GTE Telephone Operations added CML's Wireless Call Delivery component to its wireline 911 server, CML Technologies' ECS-1000.

CML meets Feature Group D connection requirements. Feature Group D requires that the 10-digit pseudo-automatic number identification and the 10-digit calling party number are forwarded to the closest PSAP. The pseudo ANI and the CPN are the cell site's identifying ANI and the caller's phone number, respectively. With the pseudo ANI, a wireless 911 server is able to pinpoint the cell sector where the call originated while the CPN allows the PSAP to call back the cellular phone user.

Once the 911 call is made, the cellular provider's mobile switching center will forward the assigned pseudo ANI and the CPN to the ECS-1000, which is acting as the router as well. The ECS-1000 with the wireless call delivery capabilities will dip into the GTE HP 300 database holding the pseudo ANIs and their corresponding pseudo-automatic location identifiers before forwarding the information to the nearest PSAP.

While carriers wait for E911 technology to evolve through these tests, many companies are unveiling ideas for global positioning system-based products.

Zoltar Satellite Alarm Systems recently received a broad U.S. patent covering the integration of a GPS unit within a cellular phone